

Delta Vision

Context Memorandum: Emergency Preparation, Response and Recovery

This context memorandum provides critical information about emergency preparation, response and recovery to support policy making. As they are developed, the context memos will create a common understanding and language about the critical factors in establishing a Delta Vision.

This is an iterative process and this document represents the beginning of a dialogue with you about how best to understand these lessons and to inform recommendations by the Delta Vision Blue Ribbon Task Force. You have two weeks to submit comments that may be incorporated into the next iteration.

You may submit your comments in two ways: either online at dv_context@calwater.ca.gov or by mail. If you are using mail, please send your comments to: Delta Vision Context Memo: Emergency Preparation, Response and Recovery, 650 Capitol Mall, 5th Floor, Sacramento, CA 95814.

Your attributed comment will be posted on the Delta Vision web site (<http://www.deltavision.ca.gov>). Please cite page and line number with specific comments; general comments may be keyed to sections.

Your participation in this iterative process is valuable and important and is greatly appreciated. Thank you for your comments.

Context Memorandum: Emergency Preparation, Response and Recovery

Iteration 1: January 23, 2008

1 The Sacramento-San Joaquin Delta is formed by the convergence of the Sacramento
2 and San Joaquin Rivers in addition to the Calaveras, Cosumnes, and Mokelumne rivers.
3 The Delta and the Suisun Marsh are important components of the San Francisco
4 Estuary, which is the largest estuary on the Pacific Coast and one of the largest in the
5 United States. As such, the Delta delivers numerous social and ecological services and
6 is the hub in California's statewide system of water management and redistribution. It
7 provides drinking water to 23 million Californians and irrigation water to crops worth
8 billions of dollars. The Delta is an important recreation area for millions of visitors. Key
9 transportation and utility lines crisscross the Delta landscape; these lines carry
10 commercial goods, electricity, natural gas and petroleum products that are critical to the
11 state's economy. Other social-ecological services include waste disposal, contaminant
12 detoxification, recycling, recreational and commercial fishing, and hunting.

13
14 The Delta area covers more than 1,315 square miles (840,000 acres) of which 66
15 percent is agricultural (about 500,000 acres), 9 percent is urban, and 14 percent is in
16 conservation. In 2000, nearly 400,000 people lived in the region and there were 165,000
17 dwellings. At the periphery of the Delta, following and defining the triangular shape of the
18 region, three corners of the Delta are the Sacramento, Stockton and East Bay urban
19 areas. These urban areas, along with the towns within the Delta, are among the fastest
20 growing urban regions in California. Five counties (Solano, Contra Costa, Sacramento,
21 San Joaquin, and Yolo counties) have jurisdiction in the Delta.

22
23 The social-ecological services of the Delta, critical to the social-ecological health of
24 California, are subject to a range of threats such as floods, toxic spills, or large fires.
25 The principle catastrophic event facing the Delta is flooding from levee failures or intense
26 storms. Flooding is the most common and damaging natural disaster in California and
27 more than 90 percent of the Delta's land area is within Federal Emergency Management
28 Agency (FEMA) flood zones. Because floods are the main threat to the Delta, this
29 context memo focuses on response to flood emergencies; it is noteworthy, however, that
30 the principles described in the context memo pertain to other kinds of catastrophic
31 events as well.

32
33 There is a potential statewide economic impact from Delta flooding that is currently being
34 addressed by several initiatives intended to strengthen the Delta's emergency response
35 program. The need for regional emergency response planning and recovery is even
36 more important as precipitation patterns change and sea level rises, as Delta islands'
37 soils continue to subside, and as urban encroachment puts more people in harms way.

38
39 Recent national and regional events have also underscored the need for heightened
40 preparedness to address large-scale emergencies. Delta preparedness requires the
41 combined efforts, partnership, and leadership of many diverse entities at various levels
42 of society and government. Advanced coordination is the key to jointly addressing
43 challenging issues in emergency management.

44
45 California has a long history of disasters and disaster responses. We are known for our
46 earthquakes, some of which have required tremendous emergency response efforts.
47 We also have large and complex wildfires, almost on an annual basis. Because
48 California is familiar with large scale disasters, it has developed and standardized
49 emergency management systems that are implemented across jurisdictions to

Context Memorandum: Emergency Preparation, Response and Recovery

Iteration 1: January 23, 2008

1 coordinate response in a faster and more comprehensive manner. Five county
2 governments have jurisdiction in the Delta, and all have produced disaster response
3 plans. The Delta Protection Commission (DPC) is facilitating planning for coordinated
4 regional emergency response in the Delta. This effort includes the five county offices of
5 emergency services, the Governor's Office of Emergency Services (OES), the
6 Department of Water Resources (DWR), the U.S. Army Corps of Engineers (USACE)
7 and many other state and federal agencies. The goal of this regional effort is for the
8 various agencies to work together to ensure that emergency planning and response in
9 the Delta are integrated and coordinated.

10
11 This integration includes making consistent key intersecting issues among the counties'
12 planning efforts. These issues include, but are not limited to: exit and entrance
13 transportation routes, multi-jurisdiction evacuations, and emergency communications
14 between emergency officials and the public. On a similar note, general assumptions and
15 terminology in the counties' emergency plans need to be integrated and consistent to
16 ease the communication and reduce the risk of misunderstanding.

17
18 These topics need to be linked and collaboratively developed to avoid inconsistent and
19 contradicting planning efforts. DPC is helping by creating a framework to make this
20 multi-party and multi-plan coordination possible. Each planning effort currently underway
21 has its own mandate and core goal(s). According to the OES, this project has the
22 potential to serve as a model for activities throughout the region, as well as the state.

23
24 Under the Standardized Emergency Management System (SEMS), the assumed
25 operational priorities by the state (from State of California Emergency Plan 2005) are:

- 26
- 27 1. protecting life (highest priority), property, and the environment;
 - 28 2. meeting the immediate emergency needs of people, including rescue, medical
29 care, food, shelter, and clothing;
 - 30 3. restoring temporarily facilities, whether publicly or privately owned, that are
31 essential to the health, safety, and welfare of people (such as medical, sanitation,
32 water, electricity, and emergency road repair);
 - 33 4. meeting the rehabilitation needs of people, including provision of temporary
34 housing, food stamps, and employment; and
 - 35 5. mitigating hazards that pose a threat to life, property, and the environment.
- 36

37 This memo is structured around one over-arching principle and nine key principles,
38 which are summarized below, together with their main policy implications.

39
40 **Over Arching Principle: *The Delta will continue to have events requiring***
41 ***coordinated emergency response and recovery.*** Those directly involved with the
42 Delta and emergency response know this, now there is increasing public awareness of
43 the risks to the Delta. The Delta Risk Management Study (DRMS) conducted for DWR,
44 states that a significant number of levee failures can be expected over the next 100
45 years from both earthquakes and floods.

46
47 There are more than 1,100 miles of Delta levees and about 230 miles of Suisun Marsh
48 levees, which provide mostly low levels of protection for adjoining lands. There are 65
49 main islands and tracts in the Delta; islands and most Delta services depend on this

Context Memorandum: Emergency Preparation, Response and Recovery

Iteration 1: January 23, 2008

1 levee system for protection. Most of these levees were locally built and maintained and
2 protect land that is below sea level, some areas by as much as 25 feet. (Sea level is
3 about 0.6 foot higher today than it was in 1920 and is projected to rise at a more rapid
4 rate in the future.) Land subsidence rates of 0.5 to 1.5 inches per year are common.
5 Levees can fail for many reasons, and the kinds of levee failures that flooded Delta
6 islands 166 times since 1900 can happen almost any time during the year, although the
7 Delta has gone many years without a levee failure as well.

8
9 *Main Policy Implication:* Catastrophic events will happen in the Delta, some of which will
10 affect multiple islands and will significantly impact regions outside the Delta as California
11 relies on the Delta as a hub of critical social-ecological services. Society's ability to react
12 and recover from these events depends on our planning and coordination prior to the
13 actual events.

14
15 **Principle 1: *Emergencies involve people, property, and resources.*** Governmental
16 organizations tend to focus on their priorities and their decisions are based on their
17 experience. Some agencies tend to focus on water resources, while others tend to
18 focus on agricultural issues, and still others will see the serious risk to human life. Since
19 large scale emergencies have multiple facets, multiple viewpoints allow for a more
20 comprehensive response.

21
22 For example, during the evacuations of New Orleans prior to Hurricane Katrina, public
23 safety officials disregarded the strong attachments that many people have for their pets
24 and property. Emergency responders did not consider these values and needs, and
25 consequently, a significant number of people were not well-served. Other emergency
26 response processes also were negatively impacted as people refused to leave their
27 animals or property, jeopardizing response and recovery plans and personnel. After-
28 action reports have identified that an understanding of these values and needs rested
29 with organizations that were isolated from response management and were not readily
30 available to the decision-makers.

31
32 In planning for, responding to, and recovering from large scale emergencies, decision-
33 makers needs to take into account how these various issues can complicate each
34 phase. Crafting and implementing an effective and comprehensive emergency command
35 structure is critically important to ensure comprehensive and efficient response and
36 recovery. The Delta Protection Commission and the five Delta counties envision such a
37 structure: the Joint Command of the Sacramento-San Joaquin Delta Region Multi-
38 Agency Coordination System is being developed.

39
40 *Main Policy Implication:* The planning for, responding to, and recovering from
41 catastrophic events within the Delta needs to consider the variety of issues that surround
42 protecting life, property, and resources in a well thought out and coordinated manner.
43 Issues of jurisdiction, coordination, and responsibility need to be addressed and possibly
44 revised to address responses to regional catastrophic events. In dealing with the
45 issues, comprehensive planning that involves many areas of technical expertise from
46 multiple agencies must be considered and used.

47

Context Memorandum: Emergency Preparation, Response and Recovery

Iteration 1: January 23, 2008

1 **Principle 2: *There is a strong and complex interdependency between the Delta***
2 ***and the rest of the state.*** Although the Delta only covers about 1 percent of California's
3 area, the region is at the heart of several California resource issues. Approximately 3
4 million acres of agricultural land outside of the Delta receives part of its irrigation water
5 from the Delta. If this water delivery is blocked for an extended period, which is likely
6 with a multi-levee failure, California agriculture and dependent businesses (from
7 processing to shipping to marketing) will be severely affected. Locally within the Delta,
8 agriculture is the primary land use and the potential loss of even a few islands could
9 severely affect important areas of California's agricultural industry.

10
11 About 25 percent of the urban water used in California is diverted from the Delta and
12 nearly 66 percent of Californians get some part of their drinking water from the Delta. A
13 multi-levee failure also would greatly impede drinking water deliveries to those who rely
14 on this source. The channels created by the levees impact drinking water quality as well,
15 and under certain levee failure scenarios, water quality within the Delta channels could
16 degrade to a point where the Delta could no longer be used as a source of drinking water
17 or as an agricultural supply for either in-Delta or out-of-Delta use.

18
19 The Delta islands and channels created by the levees are vital transportation and utility
20 corridors to other regions of California. As with agriculture and drinking water, this
21 infrastructure is important both within the Delta and to the rest of California. Long-term
22 outages of roads, electrical, natural gas, petroleum, or communications lines will have an
23 impact on the state's economic well-being.

24
25 *Main Policy Implication:* Catastrophic events within the Delta will have far reaching
26 impacts and will require a state-wide systematic response to minimize and mitigate their
27 effects. Environmental, economic, and quality of life issues are more far ranging than
28 those only associated with the immediate area. California's emergency planning and
29 response relies on the statewide mutual aid system. This system needs to be used
30 efficiently for flood emergencies within the Delta.

31
32 **Principle 3: *Standardized response leads to easier, faster, and better decisions.***
33 For resources to be effectively managed during an emergency, coordination and
34 common communication channels need to be instituted. A system of management will
35 only work if those being managed (e.g., evacuees) and those managing (e.g., first
36 responders) know the system and are working within it. During an emergency,
37 disorganization and misdirection have life-threatening consequences.

38
39 California has been a leader in developing emergency management systems. In 1993
40 the state adopted the Standardized Emergency Management System (SEMS) after
41 reviewing the communications breakdown that emergency responders experienced
42 during the 1991 Oakland firestorms. In that disaster, emergency responders had
43 difficulty communicating between responding agencies due to the lack of standard radio
44 frequencies. For similar reasons, and with California's leadership, the federal
45 government developed the National Incident Management System (NIMS). The
46 Homeland Security Presidential Directive-5 requires federal agencies to use NIMS and
47 under Executive Order S-2-05, the governor directed the Office of Emergency Services
48 to integrate California's emergency response system with NIMS.

49

Context Memorandum: Emergency Preparation, Response and Recovery

Iteration 1: January 23, 2008

1 Multiple agencies and organizations will respond to large emergencies within the Delta
2 and its surrounding region. SEMS and NIMS provide an organizational structure with
3 enough flexibility to address a variety of situations. Training (including training
4 exercises) and extensive pre-
5 planning are important to take full
6 advantage of this structure provided
7 by SEMS and NIMS. Under the
8 auspices of the Delta Protection
9 Commission, the five Delta counties
10 are developing a regional
11 emergency response plan that will
12 incorporate SEMS and NIMS.

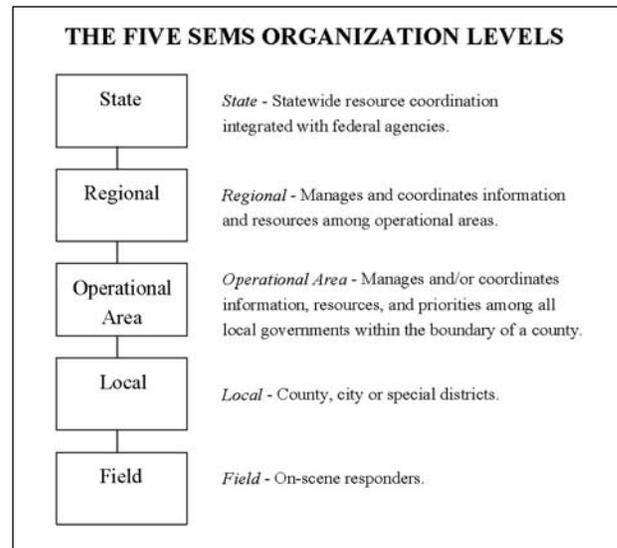
13
14 *Main Policy Implication:* California
15 should remain a leader in
16 developing and improving
17 emergency management systems.
18 We must continue to require the
19 implementation and training of all
20 levels of government on the current
21 standards under SEMS and NIMS.
22 Work to integrate SEMS and NIMS

23 into a Delta regional emergency response plan needs to continue and be adequately
24 funded. Quick, well-coordinated emergency response in the Delta is necessary to
25 maintaining critical social-environmental services provided by the Delta to the entire
26 state.

27
28 **Principle 4: An event has both geographic and temporal scales, and different**
29 **scales have different needs.** Different sources of levee failure require different
30 responses. A large flood may cause local failures of levees on several different islands,
31 while a “sunny-day” failure caused by a levee weakness may involve only one island. A
32 large earthquake may cause larger portions of levees to fail on several islands at the
33 same time, while damaging many others. A single levee failure may only require a
34 minimum evacuation on one island, while another levee failure near an urban area could
35 require massive evacuations. If a levee fails in the winter, the impact to water supply
36 could be minimal, but that same type of failure during the summer could have major
37 impacts on water supplies for either local use or exports.

38
39 *Main Policy Implication:* In planning for disaster response within the Delta, scenarios
40 should be developed that encompass a comprehensive range of geographic and
41 temporal scales. Responses to these scenarios need to be rehearsed regularly both by
42 emergency responders and the citizens. Knowing what to do in an emergency saves
43 lives; these exercises could also highlight where changes in the response plans need to
44 be made, for example, where to stockpile or pre-position emergency response supplies.

45
46 **Principle 5: The better the preparation, the better the response and recovery.**
47 Decision-making at both the incident level and the regional level is less complicated and
48 more likely to be correct if those making the decisions know three things: (1) what the
49 capability of the response systems is, (2) what the expected outcome of the decisions



Context Memorandum: Emergency Preparation, Response and Recovery

Iteration 1: January 23, 2008

1 will be, and (3) how the event will likely react to the actions resulting from those
2 decisions. This can be achieved by planning and preparing before a disaster.
3 Preparation includes training personnel and acquiring and deploying vital resources
4 before the disaster. Emergency responders and their managers will be able to carry out
5 actions and make decisions during any event, but their actions and decisions will be
6 more focused and timely if many of the questions and uncertainties they will likely face
7 are already understood.

8
9 *Main Policy Implication:* Planning and preparing the system for response will lessen
10 wasted actions and resources as well as will save lives and property. This level of
11 planning will require stable funding for equipment and training. Additional storage and
12 evacuation sites may need to be purchased or leased and maintained. Materials such as
13 rock to close levee breaches need to be pre-positioned or contracts for those materials
14 need to be in place to help with the quick response time.

15
16 **Principle 6: Practice makes for a better response.** Cal Fire, the state's fire fighting
17 agency, is a national leader in training and responding to emergencies. Because they
18 respond to several fire disasters every year, they are able to continually improve their
19 response system and personnel. Other disasters, including floods, occur less frequently
20 and so it is harder to maintain continuity in running or improving the response system.

21
22 The five Delta counties and their respective emergency departments are working to
23 coordinate and practice for a large scale emergency in the Delta.

24
25 *Main Policy Implication:* Emergency response agencies responsible for the Delta need
26 to practice their response strategies regularly. Emergency response personnel training
27 should include assisting with disasters in other areas or in other types of disasters.
28 Whole communities need to practice emergency response as well, because citizens also
29 need to know what to do during a disaster.

30
31 **Principle 7: Organizations do best what they believe is a priority.** This is a well-
32 known principle borrowed from business management. An organization attracts people
33 that believe in its mission and in this way, over time, the organization's priority becomes
34 ingrained. Switching priorities of an organization during an emergency is difficult and
35 usually not very efficient. For example, the California Department of Fish and Game
36 (DFG) is better suited for protecting conservation areas within the Delta than they are for
37 protecting transportation resources.

38
39 Both at the state and local level, agencies or divisions of agencies exist that have a core
40 focus on emergency response and recovery. Local governments have fire and police
41 departments. The state has Cal Fire and the Highway Patrol. In addition, the
42 Governor's Office of Emergency Services has counterparts within cities and counties.
43 Within agencies, there are divisions such as the Department of Water Resources' Flood
44 Management and the DFG's Oil Spill Prevention and Response.

45
46 The agencies and divisions that place a priority on emergency preparation and response
47 are usually the most effective during actual events due to their continual focus on hiring
48 and training of key personnel. In addition, valued personnel tend to stay with

Context Memorandum: Emergency Preparation, Response and Recovery

Iteration 1: January 23, 2008

1 organizations that support their interests by providing opportunities for training and
2 application of their expertise.

3
4 *Main Policy Implication:* Emergency response and recovery should be a priority at all
5 times for any agency that is required to lead or manage an event. The commitment to
6 recruit, train, and retain effective emergency response and recovery personnel and
7 management depends on an agency's overall commitment to emergency response and
8 recovery, including its focus between events. The unique needs of coordinating
9 emergencies in the Delta region are not easily addressed within traditional jurisdictional
10 lines that are divided into three regions, five counties, and many cities, towns, and
11 businesses.

12
13 **Principle 8: Authority needs to be delegated to those with responsibility and**
14 **knowledge – usually delegated to the lowest level practical.** In any emergency,
15 those at the scene will know best what is needed to rectify the situation. A basic tenet of
16 SEMS is to give the incident commander the ability to make tactical decisions without
17 the need to go through multiple channels. Local Emergency Operations Centers and the
18 state's Regional Emergency Operations Centers act in support of the Incident Command
19 for tactical measures while the local and regional emergency operations centers
20 determine strategic objectives and set priorities for resource allocation.

21
22 A significant issue is who decides when to evacuate the local population. SEMS has
23 specific procedures that address this decision. All agencies and organizations that
24 participate in emergency response need to be mindful of this concept for the multiple
25 types of decisions that need to be made during any event.

26
27 *Main Policy Implication:* State agencies are required by state regulations and executive
28 order to comply with SEMS and NIMS. Under federal regulations, all federal agencies
29 must comply with NIMS. Local governments must comply with SEMS and NIMS to
30 receive certain state and federal emergency preparedness and disaster response funds.
31 These management systems direct how authority and responsibility is delegated during
32 an event. Incident Command determines tactical methods and local, regional and state
33 operational commands determine strategic goals and objectives, and allocate resources.
34 Local, state, and federal agency managers need to be trained regarding their roles and
35 responsibilities under SEMS and NIMS so decisions can be made at the right level, in a
36 timely and informed way.

37
38 **Principle 9: Public financing and assistance including after-action recovery**
39 **should consider future societal needs and be planned accordingly.** Disaster
40 recovery can be very expensive and could re-set the course for future uses of an area.
41 At the same time, decisions during an event can be emotionally charged and this
42 emotional reaction may thwart the most practical decisions. Rebuilding after a disaster
43 will likely take place over a long time, so there is a need for regional plans to include
44 priorities and ideas of what ought to be rebuilt or restored.

45
46 *Main Policy Implication:* We know that the levees in the Delta will fail and we will lose
47 islands. Our policymakers and society's leaders should debate how and what will be
48 rebuilt or restored when large scale disasters occur.

Context Memorandum: Emergency Preparation, Response and Recovery

Iteration 1: January 23, 2008

1 *Section 1. Types of Emergency Events in the Delta*

2 Disasters within the Delta can vary tremendously. For emergency managers,
3 categorizing the type of disaster and its extent can help with efficient planning and
4 response. This categorization can help determine how large a response is required;
5 timing of resource needs, and also give managers an idea of the timeline associated
6 with a situation. Emergencies in the Delta are likely to fall into one of six main
7 categories: local emergency response, non-flood events, watershed driven flood events,
8 high-tide with high-wind events, levee failure—“sunny day” failure, and earthquakes.
9

10 **Local Emergency Response.** Emergencies can vary from small events to large state-
11 wide events. Within the Delta, local agencies respond to emergencies on a regular
12 basis. The Delta has many important highways, rail lines, commercial shipping and
13 recreational boating corridors, pipelines, and power lines. The Delta is also the home,
14 work place, and recreation area for many. Accidents, structural failures, fires, and acts of
15 nature can occur at any time. Most of these are relatively small both in scale and
16 impact, and are easily handled by local agencies.
17

18 Even for the management of small scale incidents, the Delta does have some distinct
19 issues. Some Delta islands have very limited access, making it difficult to get
20 emergency response to the island and the incident may further restrict that access. The
21 Delta is defined by water channels, which can complicate hazardous materials spills,
22 making it difficult to isolate and clean up the spill. Due to the region’s geography, strong
23 winds can move hazardous gas releases swiftly to a nearby area. Much of the Delta
24 has peat soils that are susceptible to ground fires that can be difficult to extinguish.
25 Small incidents involving a levee in the Delta can easily expand to a much larger event
26 as water surges into an island or if weather conditions change.

27 **Non-Flood Events.** Since the Delta region is home to about 400,000 people and has
28 several important transportation corridors for vehicles, international shipping, and trains,
29 there is always the potential for serious disasters. Trains, commercial trucks, and ships
30 can transport large amounts of materials that, if spilled, can threaten the safety of
31 humans and the environment. Additionally, there are numerous pipelines and storage
32 areas that can also be the source of unsafe hazardous materials releases. Accidental
33 releases can be caused by vehicle accidents, fires or by operational problems. Spill
34 prevention plans and risk assessment of facilities are required by regulation (Table 1).
35

36 Responses to hazardous material spills are the responsibility of the California
37 Department of Transportation, the California Public Utilities Commission, and the
38 Highway Patrol if they originated from a moving source. If a spill is from a stationary
39 source, the Governor’s Office of Emergency Services’ California Accidental Release
40 Prevention Program (CalARP) will coordinate the response. The Department of Fish
41 and Game’s Office of Spill Prevention and Response (OSPR) is responsible for
42 hazardous materials spills in water. In addition, local government entities that have
43 responsibilities related to hazardous materials incidents would include, but are not
44 limited to:

Context Memorandum: Emergency Preparation, Response and Recovery

Iteration 1: January 23, 2008

- 1
- 2 • Flood Control Districts
- 3 • Sanitation Districts
- 4 • School Districts
- 5 • Parks and Recreation
- 6 Departments
- 7 • Port Authorities
- 8 • City Harbor Departments
- 9

10 Though not always recognized by the
11 public as an emergency incident, an
12 outbreak of a noxious non-native
13 species can be handled by using an
14 emergency management system.
15 California Department of Food and
16 Agriculture and the Department of Fish
17 and Game will respond to certain non-
18 native species invasions with a
19 response that follows the established
20 Incident Command System.

21 **Watershed Driven Flood Events.**

22 Flood events in the Delta are most
23 likely tied to heavy rains within Delta
24 watersheds or quick melting of the
25 snow pack in those Delta watersheds.
26 Flooding caused by local rain, though
27 possible, is not much of an issue except
28 when combined with high winds and
29 high tides (see below). The Delta's
30 watershed can receive high amounts of
31 rainfall under several conditions, but the
32 most prevalent large event is the
33 "Pineapple Express," a weather
34 condition that sets up a significant
35 amount of deep tropical moisture that
36 travels over the Hawaiian Islands on its way to the western United States. These
37 systems are usually warm enough that precipitation occurs as rain up to higher
38 elevations and can carry enough moisture that localized flooding can occur for extended
39 periods. Runoff from the watersheds can be very high both locally and regionally.

40 For the Delta, flood conditions from watershed events can be predicted. The
41 meteorological conditions that lead to these events are usually evident for nearly a week
42 before the precipitation falls. Once the rain starts, rain and river gages will track the rise
43 in water. The National Oceanic and Atmospheric Administration's California Nevada
44 River Forecast Center can predict river stages as the high flows travel towards the Delta.
45 Depending on the river system, the water crest maximum can be delayed by more than
46 a week after the initial rainfall. Although both weather forecasting and river stage

Table 1: Legally Mandated Programs Requiring Businesses to Conduct Hazard Analyses and Risk Assessments.

California Accidental Release Prevention (CalARP) Program required pursuant to H&SC 25531 (*et seq.*), implements the federal accidental release prevention program with additional California-specific requirements. This program requires any business with more than a threshold quantity of a regulated substance, unless exempted, to implement an accidental release prevention program and develop a risk management plan.

Air Toxics "Hot Spots" Information and Assessment Act required pursuant to H&SC 44300 (*et seq.*) requires emitters of hazardous air contaminants to conduct health risk assessments to evaluate those emissions. This program is designed to identify, assess, and control ambient levels of hazardous air pollutants.

California Refinery and Chemical Plant Worker Safety Act required pursuant to California Labor Code § 7850 (*et seq.*), evaluates chemical process safety when dealing with the risks associated with handling or working near hazardous chemicals. The law requires the employer to conduct a hazard analysis for identifying, evaluating, and controlling hazards involved in a process.

Worker Health and Safety Regulations [federal (29 CFR 1910.120) and state (8 CCR 5192)] require employers to identify, evaluate, and control hazards employees may encounter during hazardous waste operations and emergency response.

Context Memorandum: Emergency Preparation, Response and Recovery

Iteration 1: January 23, 2008

1 forecasting are not exact, the ability to understand the potential of a weather pattern
2 allows emergency managers to position resources before actual floods happen.

3
4 Snowmelt events usually are slow in building up to flood conditions. The conditions that
5 the emergency managers watch for are a large snow pack and a predicted early, intense
6 heat wave. A snowmelt flood also can be triggered by a warm rain storm. In most
7 instances, the snow pack will need to have already started the melt process before the
8 new warming or rainstorm. For the Delta, since there are a lot of river miles between it
9 and the Sierra snow pack, these conditions can also be predicted and followed as they
10 build up and move into the Delta.

11
12 Levees may fail in high water events without being over-topped. Most of the levees
13 within the Delta and on its periphery are “wet-levees,” meaning they hold back water on
14 a continual basis. On the tributaries leading into the Delta, and some levees within the
15 Delta are “dry-levees,” meaning they are only wet during high water events or when an
16 up-gradient levee has failed. For both types of levees, conditions during high flows will
17 expose more of the levee to water and put more pressure than normal on the structure.
18 Levee failures during sustained events can occur when unseen flaws are exposed.

19 **High-Tide with High-Wind Events.** Another type of flood within the Delta happens
20 when a larger-than normal high tide coincides with high wind conditions. Since low
21 pressure systems tend to create both higher tides and stronger winds, these conditions
22 are likely to occur together. As the climate changes and sea level rises, these conditions
23 could be more likely to threaten the existing levees within the Delta. The most
24 susceptible levees are those with long fetches that correspond to wind direction. A fetch
25 is the distance over which wind blows unobstructed over water, and is a factor that
26 affects wave buildup. These events can be predicted to some degree, but their
27 magnitude of overlap is difficult to pin-point. Similar to sustained high flows, a high tide
28 and high wind may be the trigger for a levee failure from a previously undetected defect.

29 **Levee Failure – “Sunny Day” Failure.** The Jones’ Tract levee failure on June 3, 2004,
30 was a “sunny day” failure. This type of levee failure occurs when conditions other than
31 meteorological cause a levee to breach, usually happens without warning, and unfolds
32 quickly. During the Jones’ Tract failure, there was a significant loss of property as
33 equipment and buildings were flooded.

34
35 One issue with Delta island flooding is potential to lose other islands due to increase
36 stress on the flooded island’s levees and seepage onto adjoining islands. The levees
37 protecting Delta islands are designed to hold water out, not keep water in. When an
38 island is flooded, the wind fetch is expanded, which will greatly increase the wave
39 energy that can impact the levee. Since the interior of most levees are not constructed
40 to withstand wave action, an immediate flood fight operation is to protect these interior
41 surfaces by applying rock or plastic sheeting to them. Seepage from a newly flooded
42 Delta Islands is a potential issue to other islands due to the underlying soil structure. If
43 the soil contains sand layers that get exposed during the initial scour at the failure site,
44 or if a layer is near enough to the surface, water can seep from one island to the next. A
45 seepage event may take weeks to materialize, so continual monitoring is required.

46

Context Memorandum: Emergency Preparation, Response and Recovery

Iteration 1: January 23, 2008

1 **Earthquakes.** The Department of Water Resources' Delta Risk Management Strategy
2 details the risk of levee failure due to an earthquake in the East Bay or western Delta. A
3 large earthquake can be extremely destructive within the Delta, potentially causing
4 multiple levee failures and causing flooding to several islands. Another concern is that a
5 levee that fails during an earthquake will likely be damaged over a larger part of its
6 length than it would be under a different kind of breach. Most floods in the Delta were
7 contained to small sites and could be repaired to make the system whole again. With an
8 earthquake-induced failure, the likely extended length of the levee failure would make
9 repairs more complex, cause a faster inundation of the island, and potentially cause
10 structural damage to other levees near the failure with the increase water flow through
11 the channels.

12
13 If multiple levees fail, the transportation and shipping infrastructure of the Delta will be
14 compromised. This will complicate emergency response, both in how resources would
15 be deployed and how evacuations would take place. If a large enough earthquake
16 occurs, impacts beyond the damage to levee integrity such as bridge failures, building
17 collapse, and utility facilities damage will require and compete with levees for attention
18 and resources.

19 *Section 2. Distinctive Issues of Emergency Management in* 20 *the Delta*

21 Emergency managers and planners in the Delta have a difficult task. The region's land
22 and waterscape that provides the Delta with its livelihood and identity also complicates
23 emergency response plans. Main issues of emergency management in the Delta include
24 subsidence and soil; multiple jurisdictions, transportation planning, hazardous materials,
25 and multiple island flooding.

26
27 **Subsidence and soil.** There are many reasons why Delta emergency managers and
28 planners have a difficult task. The Delta islands, especially those in the western Delta,
29 are mostly below sea level. Much of the Delta's interior has peat soils underlain by
30 significant sand layers; this type of soil structure does not provide an adequate base for
31 important infrastructures such as highways, bridges, and levees. Since the Delta serves
32 as an important recreational area, there is likely to be a large number of visitors in the
33 area of a disaster that would be unfamiliar with evacuation routes or other important
34 information. Short-term visitors may not have family resources within the area to fall
35 back on, and it is hard to know if all visitors are accounted for during an event.

36
37 **Multiple jurisdictions.** Most regions have multiple organizations with multiple
38 responsibilities and emergency response capabilities; each region is unique in its
39 combination. The Delta is under the jurisdiction of five counties--Solano, Contra Costa,
40 Sacramento, San Joaquin, and Yolo counties. There are also many other local, state
41 and federal agencies with some emergency response jurisdiction or responsibility within
42 the Delta. Local businesses, non-governmental organizations and utilities also have
43 some resources available for response and recovery (Table 2).

Context Memorandum: Emergency Preparation, Response and Recovery

Iteration 1: January 23, 2008

1 Table 2: Organizations and Agencies involved with Emergency Response and Recovery for
2 Flooding and Seismic Events

<i>Non-Governmental Organizations (NGOs)</i>	<i>Local Government</i>	<i>State Government</i>	<i>Federal Government</i>
American Red Cross	Reclamation and Flood Control/Levee Districts	Governor's Office of Emergency Services (OES)	Federal Emergency Management Agency (FEMA)
Local REACT	Irrigation and Water Districts/Agencies	California Department of Forestry and Fire Protection (CAL FIRE)	U.S. Bureau of Reclamation (USBR)
Private Utility Companies (Gas, Electrical, Water, Rail)	Public Utilities	California Department of Water Resources (DWR)	U.S. Corps of Engineers (USACE)
Coast Guard Auxiliary	City Offices of Emergency Services	California Department of Transportation (Caltrans)	U.S. Coast Guard (USCG)
	City Fire and Police Departments	California Department of Fish and Game (DFG)	U.S. Fish and Wildlife Service (USFWS)
	City Public Works Departments	California Department of Food and Agriculture (DFA)	NOAA's National Marine Fisheries Service (NOAA's Fisheries Service)
	County Offices of Emergency Services	Regional and State Water Resource Control Boards	U.S. Geological Survey (USGS)
	County Fire and Sheriff Departments	California Highway Patrol (CHP)	NOAA's National Weather Service
	County Public Works Departments	California Department Boating and Waterways (Cal Boating)	
		California National Guard	
		California Department of Corrections and Rehabilitation (CDCR)	
		California Conservation Corps (CCC)	

3

Context Memorandum: Emergency Preparation, Response and Recovery

Iteration 1: January 23, 2008

1
2 **Transportation planning.** In the Delta, moving responders, evacuees, materials,
3 equipment and other resources will be complicated during a large disaster. Critical flood
4 fighting resources that take time to acquire and transport should be pre-deployed at
5 accessible and safe areas. Designated transportation routes and corridors that have
6 protected and accessible staging areas need to be planned, as do evacuation routes for
7 residents and visitors. These evacuation routes and evacuation centers will need to be
8 coordinated with adjoining regions in the event larger disaster events such as an East
9 Bay Seismic event occurs. Locations for Incident Command Posts should be pre-
10 determined and use agreements reached during the preparation phase.

11
12 **Hazardous materials.** Many farms and other businesses store materials that are
13 hazardous when they are released uncontrolled into the environment. These materials
14 pose a potential not only to harm the environment, but also to hamper response and
15 recovery efforts because of potential harm to humans. Emergency managers need an
16 accurate account and understanding of what materials are stored where so they can
17 make informed and safe decisions about managing the emergency.

18
19 **Multiple island flooding.** Flood recovery from a multi-island event will take a significant
20 amount of time; what takes nature minutes to destroy may take humans months, if not
21 years, to rebuild. With multiple flooded islands, the demand for pumping equipment and
22 other resources will increase; the greater the demand for resources, the more likely this
23 the recovery time frame will increase. With multiple islands failing, there is a potential for
24 water quality in the western and southern Delta to be compromised enough to stop in-
25 Delta and export pumping from the Delta. Even a short-term stoppage of water flow can
26 have serious consequences for the regional and state well-being.

27
28 If the Delta suffers a multi-island flood event, the regional Delta economy will be severely
29 affected, and the state economy may also face serious impacts. The disaster recovery
30 goal is to return the situation to its normal conditions. With the loss of many farms and
31 businesses, and the potential displacement of many residents, full recovery from a multi-
32 island flood event may not be possible.

33

34 *Section 3. On-Going Efforts*

35 There are several on-going efforts regarding emergency response planning for the Delta.
36 Three of the more notable efforts are those by the Delta Protection Commission; the
37 Department of Water Resources—Division of Flood Management; and the Delta Flood
38 Protection Group, a consortium of emergency managers focusing on the technical
39 aspects of flood fights.

40

41 In June 2006, the Delta Protection Commission convened a summit of local elected
42 officials from the five Delta counties to discuss the subject of coordinated Delta - wide
43 emergency response planning. DPC and the Governor's Office of Emergency Services
44 provided \$55,000 to conduct background research and to identify key stakeholders
45 concerned with existing emergency planning efforts and any other parties that should be
46 involved. This effort has been on-going and has led to formalized commitments between
47 the Delta counties and with many of the state and federal agencies to coordinate

Context Memorandum: Emergency Preparation, Response and Recovery

Iteration 1: January 23, 2008

1 regional planning and response to disasters. As part of this effort, they have identified
 2 several planning efforts related to emergency management and planning (Table 3).
 3
 4 The Department of Water Resources' Division of Flood Management has taken a major
 5 role in flood response planning and response in the Delta. DWR is also coordinating
 6 with the DPC, and has developed "Delta-specific Emergency Operations Plan for the
 7 DWR." Pre-event preparation work started in May 2007 and includes all the short-term
 8 physical enhancements (such as stockpiling additional materials and initiating new
 9 emergency repair contracts) to improve DWR's immediate response to Delta levee
 10 failures. Pre-deployment of rock will commence during fiscal year 2007-2008, other
 11 materials and actions will be pursued next fiscal year. DWR is taking other actions
 12 necessary to fulfill its emergency operations plan.
 13

14 Table 3: Related Efforts Underway Regarding the Delta (from Delta Protection Commission, 2006)

Plan or Project	Agency Lead	Details
Delta Visioning Process	Resources Agency	Development of Findings and Strategic Plan underway including consideration of DRMS and BDCP)
State Hazard Mitigation Plan	OES	Re-write/update is underway
Five-county Area Command for Flood Response	DPCISJ County facilitating Delta County Participation and commitment	Has good potential to expand in scope
Regionalism Focus for UASI and other Jurisdictional efforts	CA Office of Homeland Security	Regionalism is a national and state focus for grant funding
Recovery Planning and Reimbursement	OES	Several flood events are still active with FEMA and federal Department of Homeland Security
State Water Plan Update	DWR	Update process has just begun
Bond Funds for Levy Improvements (CA Flood Safe)	DWR	Funding prioritizing discussions are underway
State Emergency Plan Update	OES	Soon to begin; for NIMS and National Response Plan compliance
Land Use and Resource Management Plan for the Primary Zone of the Delta	DPC	Policies call for Delta-wide emergency response planning pursuant to the Delta Protection Act.

15

16 **Sacramento-San Joaquin Delta Flood Response Group.** On the technical side, a
 17 group of emergency managers and agency representatives have been meeting for
 18 nearly a year to coordinate disaster response for the Delta. The Sacramento-San
 19 Joaquin Delta Flood Response Group and its efforts are related to those of the DPC, but
 20 its focus is discussing and coordinating the technical details of flood fights. As part of
 21 this effort, a Delta Multi-Agency Coordination System (Delta MACS) is being developed;
 22 the intent is to activate Delta MACS when the magnitude, complexity, and extent of a
 23 flood event require regional coordination and integration of response efforts to effectively
 24 manage the situation. The Delta MACS may be tasked to perform one or more pre-
 25 identified functions to create a regional response system. Delta MACS procedures and
 26 processes are intended to promote simultaneous, integrated, regional operations by

Context Memorandum: Emergency Preparation, Response and Recovery

Iteration 1: January 23, 2008

1 jurisdictions responding to an emergency simultaneously affecting the entire Delta
2 region; these procedures are also intended to reduce duplication of common response
3 functions among jurisdictions. This organizational structure and its functions are
4 consistent with existing emergency management systems including SEMS, the NIMS
5 and the California Mutual Aid System.
6

7 *Section 4. References*

- 8
9 Delta Protection Commission, 2006a. "Project Concept Paper: A Collaborative Approach
10 to Address the Delta's Emergency Planning, Response, Recovery and Mitigation
11 Needs". July, 2006 as downloaded November 2007 from
12 <http://www.delta.ca.gov/emergency/default.asp>
13
- 14 Delta Protection Commission, 2006b. "DPC Emergency Response White Paper;
15 Sacramento-San Joaquin Delta Regional Flood Response Group: Basis for
16 Regional Flood Response Planning" July, 2006 as downloaded November 2007
17 from <http://www.delta.ca.gov/emergency/default.asp>
18
- 19 Delta Protection Commission, 2007. "Collaborative Approach to Delta Emergency
20 Planning and Response: October, 2007 Update." October 2007. Available at
21 <http://www.delta.ca.gov/emergency/default.asp>
22
- 23 Department of Water Resources, 2005a. "Flood Warnings: Responding to California's
24 Flood Crisis." January 2005. Available at
25 [http://www.publicaffairs.water.ca.gov/newsreleases/2005/01-10-
26 05flood_warnings.pdf](http://www.publicaffairs.water.ca.gov/newsreleases/2005/01-10-05flood_warnings.pdf)
27
- 28 Department of Water Resources, 2005b. "Fact Sheet: State-Federal Flood Operations
29 Center." June 2005. Available at
30 <http://www.water.ca.gov/nav/nav.cfm?loc=t&id=100>
31
- 32 Governor's Office of Emergency Services, 1997. "Protocol for Closure of Delta
33 Waterways: Completed in compliance with the Flood Emergency Action Team
34 (FEAT): Initiative Number 7." Approved by the Standardized Emergency
35 Management System (SEMS) Advisory Board on November 1997. Available at
36 [http://www.oes.ca.gov/Operational/OESHome.nsf/ALL/E805174ED58F4F5B8825
37 6F5000617772?OpenDocument](http://www.oes.ca.gov/Operational/OESHome.nsf/ALL/E805174ED58F4F5B88256F5000617772?OpenDocument)
38
- 39 Governor's Office of Emergency Services, 2004. "Disaster Recovery and Mitigation
40 Handbook." July 2004. Available at
41 [http://www.oes.ca.gov/Operational/OESHome.nsf/LevelTwoWithNav?OpenForm
42 &Key=Plans+and+Publications](http://www.oes.ca.gov/Operational/OESHome.nsf/LevelTwoWithNav?OpenForm&Key=Plans+and+Publications)
43
- 44 Governor's Office of Emergency Services, 2005. "State of California Emergency Plan,
45 2005." September 2005. Available at
46 [http://www.oes.ca.gov/Operational/OESHome.nsf/LevelTwoWithNav?OpenForm
47 &Key=Plans+and+Publications](http://www.oes.ca.gov/Operational/OESHome.nsf/LevelTwoWithNav?OpenForm&Key=Plans+and+Publications)

Context Memorandum: Emergency Preparation, Response and Recovery

Iteration 1: January 23, 2008

- 1
- 2 Governor's Office of Emergency Services, 2006a. "OES/OHS 9/28/06 letter re Self-
- 3 Certification of NIMS Compliance FFY 2006 - with attachment and enclosure."
- 4 September 2006. Available at
- 5 <http://www.oes.ca.gov/Operational/OESHome.nsf/ALL/3D8DC8F9C9DCF2D688>
- 6 [256FCB0065B847?OpenDocument](http://www.oes.ca.gov/Operational/OESHome.nsf/ALL/3D8DC8F9C9DCF2D688)
- 7
- 8 Governor's Office of Emergency Services, 2006b. Standardized Emergency
- 9 Management
- 10 System (SEMS) Guidelines." 2006 Available at
- 11 <http://www.oes.ca.gov/Operational/OESHome.nsf/LevelTwoWithNav?OpenForm>
- 12 [&Key=Information+For+Emergency+Managers](http://www.oes.ca.gov/Operational/OESHome.nsf/LevelTwoWithNav?OpenForm)
- 13
- 14 Little Hoover Commission, 2006. "Safeguarding the Golden State: Preparing for
- 15 Catastrophic Events." April 2006. Available at
- 16 <http://www.lhc.ca.gov/lhcdir/report184.html>
- 17
- 18 Mayer, Rodney G., 2007. "Report of Activities of the Department of Water Resources"
- 19 Presented before the Reclamation Board in Sacramento, California on
- 20 September 21, 2007 available at <http://recbd.ca.gov/meetings/2007/09-21->
- 21 [2007Item6-DWRStaffReport.pdf](http://recbd.ca.gov/meetings/2007/09-21-)
- 22
- 23 National Oceanic and Atmospheric Administration, 2005. "NOAA Catches a Culprit
- 24 behind Western Storms." In NOAA Magazine, online at
- 25 <http://www.magazine.noaa.gov/>. Article viewed at
- 26 <http://www.noaanews.noaa.gov/stories2005/s2367.htm>
- 27
- 28 URS Corporation. 2007 Status and Trends of Delta-Suisun Services. Public Review
- 29 Draft, Prepared for DWR. California Department of Water Resources, March
- 30 2007. Available at <http://deltavision.ca.gov/DeltaVisionStatusTrends.shtml>
- 31
- 32 URS Corporation and Jack R. Benjamin & Associates, Inc. 2007. *Draft Summary Report*
- 33 *Phase 1: Risk Analysis Delta Risk Management Strategy (DRMS)*. California
- 34 Department of Water Resources, June 2007. Available at
- 35 http://www.drms.water.ca.gov/docs/RiskAnalysis_Summary_Report3-
- 36 [Draft062807.pdf](http://www.drms.water.ca.gov/docs/RiskAnalysis_Summary_Report3-)
- 37

Context Memorandum: Emergency Preparation, Response and Recovery

Iteration 1: January 23, 2008

1 *Attachment 1. Phases of Emergency Management*

2

3 In its 2006 report, *Safeguarding the Golden State: Preparing for Catastrophic Events*,
4 the Little Hoover Commission summarized the four phases of emergency management:

5 **Preparation.** Preparation involves activities undertaken in advance of an emergency.
6 These activities include developing operational capabilities, training, preparing plans,
7 and improving public information and communication systems.

8

9 Planning for events during this phase is critical. Disasters do not happen all the same in
10 either scale or impact. During the preparation phase, emergency managers need to
11 determine the best methods of responding to various sized and types of disasters. Most
12 local emergencies can be handled by local agencies, such as structural fires, traffic
13 accidents, and small-scale hazardous material spills. If the emergency is larger, it may
14 require coordinated response, such as a major oil spill resulting from a commercial
15 shipping accident. Catastrophes need multiple agencies responding with their specific
16 expertise.

17

18 DPC convened a summit for the five Delta counties' elected officials and the county
19 offices of emergency services in June 2006 to discuss a partnership in Delta emergency
20 planning. The five priority goals were:

21

- 22 1. Seamless coordination for response needs unhindered by geographic or
23 jurisdictional lines;
- 24 2. An educated population ready to help themselves as well as to support their
25 community;
- 26 3. A robust regional structure for emergency response that firmly supports the
27 health and safety of the Delta-wide community;
- 28 4. Coordinated management of flood fight crews, supplies, and equipment
29 operating in the Delta basin through an Internet based logistics system that could
30 allow every jurisdiction to see all available resources and obtain the closest
31 appropriate resource (either from the point of view of distance or easiest access)
32 in a crisis regardless of political or other artificial boundaries;
- 33 5. Enhanced operability for communications during events, to allow for fluid
34 interaction and collaboration.

35

36 As an outcome of this summit, a Letter of Agreement was signed by the five counties
37 pledging that their offices of emergency services would work together with the DPC on
38 Delta emergency preparedness. This group of local emergency personnel and state and
39 federal agencies are meeting regularly.

40

41 **Response.** Response is that phase where actions are taken to save lives and protect
42 property during an emergency or disaster. This phase can be further divided into three

Context Memorandum: Emergency Preparation, Response and Recovery

Iteration 1: January 23, 2008

1 stages: pre-impact response, immediate impact response, and sustained response;
2 each stage leads into the next.

3
4 *Pre-Impact Response:* With warning of a potential disaster, such as a weather forecast,
5 emergency managers can take actions to save lives and protect property before the
6 disaster happens. Depending on the forecasts and predictions, evacuations may begin.

7
8 *Immediate Impact Response:* During this stage, emphasis is placed on saving lives,
9 controlling the situation, and minimizing the effects of the disaster. During this stage,
10 mutual aid requests are made and initial assessments about the size of the response is
11 determined and communicated to local, regional and state emergency managers.

12
13 *Sustained Response:* This stage usually begins after the scope of the emergency has
14 been determined and initial control has been established. During this stage, assistance
15 is provided to victims of the disaster and efforts are made to reduce secondary damage
16 to property and the environment. Regional or statewide mutual aid may be provided to
17 assist with these efforts.

18 **Recovery.** Recovery is a phase with both short-term and long-term aspects. At the
19 beginning of an emergency, emergency managers begin recovery efforts. Short -term
20 recovery efforts include restoring vital life-support systems; long recovery efforts focus
21 on returning infrastructure systems to pre-disaster conditions. This phase also includes
22 cost recovery efforts. In many instances, cost recovery is managing the flow of funding
23 from higher levels of government (federal and state) to lower levels (state and local) for
24 the cost of services (e.g., overtime pay for emergency personnel) rendered during the
25 disaster that are determined to be beyond an organization's responsibility.

26
27 The recovery phase requires a tremendous amount of resources and time. For
28 example, in the Jones Tract levee failure of 2003, the levee breach was repaired in
29 about two months, but the farmers on the island were still restoring their land a year after
30 the event – and as of 2007, some recovery has still not been finished.

31 **Mitigation.** The mitigation phase involves those efforts to lessen the effects of future
32 disasters. In this phase, responsible agencies, organizations and individuals take actions
33 to reduce the number of potential victims, property loss, and environmental damage.
34 This is accomplished by identifying and reducing the principle causes of injuries and
35 death, and by lessening the impacts of disasters to community infrastructure and
36 societal structure. Mitigation, if done correctly will decrease demands for emergency
37 response resources in the future and is the important for sustainable community
38 development.

Context Memorandum: Emergency Preparation,

Recovery Planning Checklist (from Governor's Office of Emergency Services, 2004)

Rebuilding efforts require decisions on a number of critical activities that have long-term social, economic and physical recovery implications. In addition to common emergency planning considerations (e.g., establishing partnerships, risk identification and reduction, plan maintenance including drills and exercises) local government should consider the activities listed below during the emergency management planning process.

Physical Recovery Activities:

- Preserving historical sites
- Considering environmental concerns
- Upgrading infrastructure and utilities
- Removing debris and managing disposal sites
- Evaluating redevelopment and subdivisions
- Establishing restoration committee
- Deferring permits, fees, etc.
- Pursuing hazard mitigation projects and advancing mitigation efforts
- Modifying land use and zoning requirements
- Improving infrastructure, roads, housing
- Evaluating repair and rebuilding options
- Incorporating changes in construction standards

Governmental Recovery Activities:

- Continuing the performance of governmental functions
- Protecting essential facilities, equipment, records, etc.
- Managing donations
- Coordinating voluntary agencies
- Building community consensus
- Engaging stakeholders, special interests groups and the public in decision-making processes
- Pursuing new opportunities in community planning
- Upgrading communication systems
- Pursuing political support
- Communicating recovery activities to the public
- Addressing community questions about health consequences of the event

Social Recovery Activities:

- Promoting community participation
- Providing services for the mental health of individuals
- Evaluating community stress
- Informing the public of physiological considerations
- Restoring community values
- Promoting family and individual preparedness
- Establishing Local Assistance Centers for 'one-stop' disaster recovery services

Economic Recovery Activities:

- Establishing a documentation system to collect and store disaster-related cost information to ensure maximum state and federal reimbursement
- Addressing economic loss of the community
- Identifying available working capital
- Promoting businesses in damaged areas
- Maximizing the consumer base
- Reestablishing commercial services
- Facilitating business recovery
- Securing disaster business loans, disaster recovery assistance grants and hazard mitigation project funding